

E3
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17. (Amended) A Pb-free solder comprising a ternary eutectic composition consisting of about 93.6 weight % Sn-about 4.7 weight % Ag-about 1.7 weight % Cu having a melting temperature of about 217 °C wherein said composition promotes formation of intermetallic compounds that improve solder strength and fatigue resistance.

E4
18. (Thrice Amended) A solder joint comprising a Pb-free solder solidified in contact with an electrical conductor wherein said solder comprises [including] a ternary eutectic composition consisting essentially of about 93.6 weight % Sn-about 4.7 weight % Ag-1.7 weight % Cu having a eutectic melting temperature of about 217°C and variants of said ternary composition wherein the relative concentrations of Sn, Ag, and Cu deviate from said ternary composition to provide a controlled liquid plus solid [mushy] temperature range with a liquidus temperature not exceeding 15°C above said eutectic melting temperature, said solder joint having a microstructure comprising beta Sn phase matrix and at least two intermetallic compounds, one intermetallic compound including Cu and Sn and another intermetallic compound including Ag and Sn, distributed uniformly in the beta Sn matrix phase, said ternary composition and variants thereof being free of Ti, V, and Zr].

E5
19. (Thrice Amended) A solder joint comprising a Pb-free solder solidified about copper electrical conductors and consisting essentially of about 3.5 to about 7.7 weight % Ag, about 1.0 to about 4.0 weight % Cu and the balance essentially Sn wherein Sn is present in an amount of at least about .89 weight % Sn to promote formation of intermetallic compounds that improve solder [wettability on the electrical conductors, said solder being free of Ti, V, and Zr] strength and fatigue resistance, said solder joint having a microstructure comprising beta Sn phase matrix and at least two intermetallic compounds, one intermetallic compound including Cu and Sn and another intermetallic compound including Ag and Sn, distributed uniformly in the beta Sn matrix phase.

E6
20. (Twice Amended) A solder joint comprising a Pb-free solder ternary eutectic composition solidified in contact with an electrical conductor and consisting of about 4.7 weight % Ag, about 1.7 weight % Cu and the balance Sn wherein intermetallic compounds are formed in said solder for improving solder joint strength and fatigue resistance.

E7
21. (Thrice Amended) In a soldering process involving solidifying a molten solder, the improvement comprising solidifying a Pb-free solder comprising a ternary eutectic composition consisting essentially of about 93.6 weight % Sn-about 4.7 weight % Ag- 1.7

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weight % Cu having a eutectic melting temperature of about 217°C and variants of said ternary composition wherein the relative concentrations of Sn, Ag, and Cu deviate from said ternary composition to provide a controlled liquid-solid [mushy] temperature range with a liquidus temperature not exceeding 15°C above said eutectic melting temperature and upon solidification at least two intermetallic compounds, one intermetallic compound including Cu and Sn and another intermetallic compound including Ag and Sn, dispersed in a beta Sn matrix phase[, said ternary composition and variants thereof being free of Ti, V, and Zr].

E8
16
22. (Thrice Amended) In a soldering process involving solidifying a molten solder about copper electrical conductors [in ambient air or an inert gas cover], the improvement comprising solidifying a Pb-free solder consisting essentially of about 3.5 to about 7.7 weight % Ag, about 1.0 to about 4.0 weight % Cu and the balance essentially Sn wherein Sn is present in an amount of at least about 89 weight % Sn to promote formation of intermetallic compounds that improve solder [wettability on the electrical conductors, said solder being free of Ti, V, and Zr] strength and fatigue resistance, said solidified solder having a microstructure comprising a beta Sn matrix and at least two intermetallic compounds dispersed in the matrix wherein one intermetallic compound includes Cu and Sn and another intermetallic compound includes Ag and Sn.

E9
17
23. (Twice Amended) In a soldering process involving solidifying a molten solder, the improvement comprising solidifying a molten Pb-free solder consisting of about 4.7 weight % Ag, about 1.7 weight % Cu and the balance Sn including forming in said solidified solder intermetallic compounds that improve solder strength and fatigue resistance.

E10
18
24. (Twice Amended) A Pb-free solder consisting of about 3.6 to about 4.7 weight % Ag, about 0.9 to about 1.7 weight Cu, and the balance Sn in an amount to promote formation of intermetallic compounds that improve solder [wettability on electrical conductor material] strength and fatigue resistance.

E11
19
25. (Twice Amended) A solder joint comprising a Pb-free solder solidified in contact with an electrical conductor and consisting of about 3.6 to about 4.7 weight % Ag, about 0.9 to about 1.7 weight Cu, and the balance Sn in an amount to promote formation of intermetallic compounds that improve solder [wettability on electrical conductor material] strength and fatigue resistance, said solidified solder having a microstructure comprising a beta Sn matrix and at least two intermetallic compounds dispersed in the matrix wherein one intermetallic compound includes Cu and Sn and

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